

DISCUSSION OF THE CLAIMS

Claims 1 and 3-57 are pending in the present application. Claims 18-29 are presently withdrawn from active prosecution. The claims are amended for matters of form not affecting the scope of the claimed subject matter. Claims 47-57 are new claims. Support for the new claims is found in the previously presented claims. Further support for new Claims 55-57 is found in paragraphs [0060]; [0062]; [0027]; and [0082] of the PG publication corresponding to the present application.

No new matter is added.

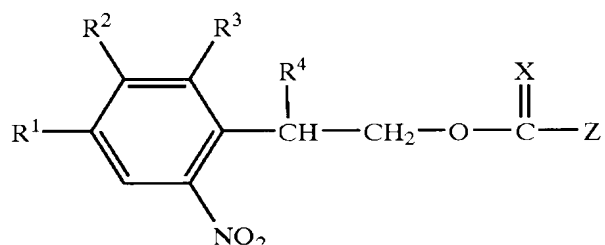
REMARKS

Applicants thank the Office for withdrawing the rejections of the previous Office Action. Applicants thank Examiner Lau and the Examiner's supervisor for the courteous interview of November 17, 2009. During the discussion Applicants' representative pointed out that the cited art is deficient with respect to the presently claimed invention.

35U.S.C. §103

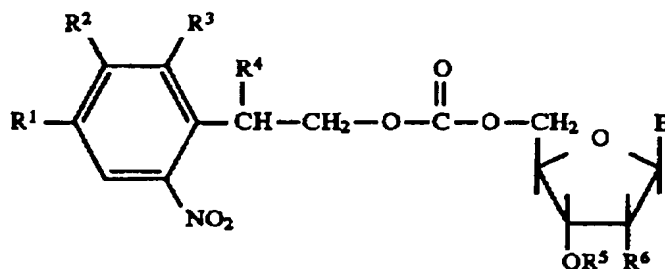
The Office now asserts the claimed subject matter is obvious over a combination of previously-cited and newly-cited art. Applicants traverse the rejection for the reason that the Office failed to set forth a *prima facie* case of obviousness.

The present claims recite a compound of formula (1) shown below for convenience:



The group R² of formula (1) of the present claims must be an aryl-based group (i.e., selected from the group consisting of an aryl group, a substituted aryl group, a heteroaryl group, substituted heteroaryl group, an aroyl group, and a substituted aroyl group).

The Office acknowledges that the primary reference (i.e., Pfleiderer - U.S. 5,763,599) fails to disclose at least one feature of the presently claimed invention; namely, Pfleiderer fails to disclose a compound of formula (1) in which the R² group is an aryl-based group. Pfleiderer discloses a compound having the following structure:



The group R² of the Pfleiderer compound is a hydrogen atom or a methoxy group.

In order to make up for this fundamental deficiency in the Pfleiderer disclosure, the Office relies on a collection of references including Fodor (U.S. 5,489,678); Walbert (Helvetica Chimica Acta - 2001); Forbes (Canadian Journal of Chemistry - 1958); Wagner (Journal of the American Chemical Society - 1967); Berlin (DE 19938092) and Adam (Journal of the Chemical Society - 1930). Contrary to the Office's assertion, the Office failed to set forth a *prima facie* case of obviousness at least for the reason that the cited art would not provide one of skill in the art with motivation to substitute the R² group of Pfleiderer with an aryl-based group.

Applicants previously pointed out that in order to establish a *prima facie* case of obviousness the Office has the burden to provide a reason why one of skill in the art would modify a known compound in a particular manner to arrive at the presently claimed compound (see pages 7-8 of Applicants' December 13, 2007 Amendment). Here the Office must provide a reason why one of skill in the art would modify the R² group of Pfleiderer by substituting a hydrogen atom or a methoxy group with an aryl group.

Applicants submit that the Office failed to set for the a *prima facie* case of obviousness at least for the reason that the cited references do not prove that one of skill in the art would be motivated to modify the Pfleiderer according to the present claim. The Office cited to numerous references in support of the rejection. Just because the Office relies on many references does not, however, mean that the Office has met its burden. At best the

Office demonstrated that one of skill in the art would be able to make the presently claimed compound. While this evidence may show that the present claims are enabled, it is an insufficient basis from which to draw a conclusion of obviousness.

Herein below Applicants (1) point out the deficiencies of the references and how these deficiencies undermine the Office's assertion of obviousness, and (2) show that even if the Office has set forth a *prima facie* case of obviousness (which the Office has not), the examples of the specification rebut the Office's allegation of obviousness.

With respect to the cited art, the Office first cites to Fodor as a teaching that the chemistry, e.g., removal rate of protecting groups, of certain compounds is related to the physical and chemical properties of the protecting group. It appears that the Office mistakenly believes that the Fodor protecting group is the photolabile group. The disclosure of Fodor quoted by the Office is irrelevant to the issue at hand; namely, whether one of ordinary skill in the art would be motivated to modify certain compounds at the R² position.

The Office further cites to disclosure at column 24, lines 49-58 of Fodor as evidence of obviousness. The cited disclosure allegedly proves that certain substitution in the core of formula (1) is conventional. The Office completely misses the mark with respect to the evidentiary value of the cited disclosure. Column 24, lines 49-57 of Fodor relates to the compounds MeNVOC and MeNPOC and their parent compounds NVOC and NPOC. Column 21 provides structures for the materials MeNVOC and MeNPOC. It is readily evident that these compounds are not substituted at a position that corresponds to the R² position of formula (1) of present Claim 1.

The Office provides no explanation whatsoever why this disclosure is in any way relevant to the issue at bar. The cited disclosure has nothing whatsoever to do with the substituting at the R² position of the compound of formula (1) of the present claims.

The Office cites to Walbert as evidence that certain groups may undergo photolysis and that the photolysis of a particular group, e.g., the core group of the compound of formula (1), has been studied. This, however, is entirely irrelevant to any analysis whether the presently claimed subject matter is obvious.

It appears that the Office relies on Walbert for disclosure that the core of the compound of formula (1) may absorb radiation. The Office fails to provide any reason why such disclosure is relevant to the patentability of the presently claimed subject matter. Walbert is entirely silent with respect to substituting the aryl group of the core of formula (1) with another aryl group. Walbert, in contradiction to the Office's logic, includes disclosure that teaches away from the presently claimed invention.

For example, Walbert describes the absorption spectra of compounds having different substitution on page 1602. A series of compounds having different substitution at the R¹, R², R³ and R⁴ position is described and compared. A comparison of Compounds 1 and 2 shows that the Office's assertion of obviousness is flawed.

Compound 1 of Walbert is substituted in an R² position which corresponds to the R² position in formula (1) of present Claim 1. However, Compound 2 is much more efficient with respect to the absorption of radiation and subsequent reactivity in comparison to Compound 1. Walbert describes this improvement of Compound 2 in comparison to Compound 1 as follows:

It is of interest to note that, while the differences in the extinction coefficients of the two compounds 1 and 2 ... are only minor and the same laser intensity was applied, the initial signal amplitudes after the laser flash differ by a factor of ca. 4 between the two compounds. This indicates that the primary reaction for the α -methylated compound (α denotes **exocyclic** position with respect to the aryl moiety) is much more efficient.

See page 1602 of Walbert (emphasis added).

Contrary to the Office's assertion, Walbert does not suggest any modification of the R² position in the core of formula (1) but instead discloses that maximum changes in properties are obtained when an **exocyclic** group is modified (an exocyclic group is one that is not a part of the core portion of the core of formula (1)).

Further still, Walbert ascribes differences in reactivity not to substitution at the R² position but to other conditions.

The extent and rate of this dissociation process can be modified by the **nature of the solvent and the acidity of the solution**.

See page 1602 of Walbert (emphasis added).

Thus, again, Walbert does not disclose or suggest modifying the R² group to improve the reactivity of the core of formula (1) but instead discloses that other factors such as solvency and acidity are important.

This teaching with respect to the R² group of Walbert continues on page 1603 of the reference. In the final paragraph on this page a comparison of compounds 4 and 5 with Compounds 1 and 2 is presented. Again, Walbert identifies the α -methyl substituted derivative as having substantially improved reactivity. Walbert does not implicate the R² group as influencing the dissociation chemistry of the respective molecules.

Nothing brings this home more than the following disclosure on page 1604 of Walbert:

... the quantum yields of photoreactions of the photolabile protecting groups considered here are only little affected by the structure of the moiety to which they are attached.

See lines 2-5 of page 1604 of Walbert.

It is inconceivable how the Office can assert that Walbert suggests modifying the chemistry of a compound of formula (1) by making changes at the R² position.

The Office further points to the scheme on page 1607 of Walbert as evidence of obviousness. Nowhere in the scheme is the carbon atom to which the R^2 group is bonded implicated in any reactivity. Instead the reactivity happens at the NO_2 group or at other exocyclic positions. Here again, the evidence which the Office asserts as supportive of obviousness in fact has nothing to do with the claimed invention.

The Office cites to Forbes as evidence that positional effects of certain substituents on phenyl group-containing chromophores are known and predictable. Applicants submit that Forbes teaches away from the presently claimed invention. In particular, the first page of Forbes makes it clear that certain patterns of substitution on a phenyl group have no effect on the compound's properties. For example:

The similarity of the spectra of ortho and meta isomers may then be related to the observation that frequently both spectra resemble that of one of the monosubstituted parent compounds. In this way, the frequently observed identity in monosubstituted parent compounds and ortho and meta isomers is explained, since in the meta isomer no interaction between the two substituents occurs because of the absence of suitable resonance forms; in the ortho isomer such resonance interaction is prevented because of steric interaction between the vicinal substituents.

See the last sentence of the second paragraph in the introduction on page 869 of Forbes.

Forbes discloses that ortho and meta substitution has no effect on the parent compound. This disclosure is directly contradictory to the Office's assertions and, in fact, teaches those of ordinary skill in the art that substituting the core of formula (1) at an ortho or meta position (i.e., at the R^2 position), would not have any effect on the resulting molecule in comparison to the parent molecule.

Forbes thus fails to provide motivation for one of ordinary skill in the art to modify the core of formula (1) at the R^2 position in the manner alleged to be obvious by the Office.

The Office cites to Wagner as a teaching that certain transitions, e.g., photoinduced transitions, are known to occur in biphenyl systems. At the outset, Applicants point out that

biphenyl is different from the compound of formula (1). The Office fails to explain why one of skill in the art would be led to believe that teachings relative to biphenyl are applicable to compounds of formula (1) which are substantially different from biphenyl in terms of substitution and the inclusion of heteroatoms.

Further still, Wagner discloses the use of biphenyl as a quenching agent. Wagner goes so far as to highlight the stability and resistance to reactivity of biphenyl:

Since biphenyl absorbs only negligibly at 3130 Å and is not known to undergo any photochemical changes, it seemed that it might be a choice quencher for use in studies of the triplet-state photochemistry of ketones.

See the first paragraph in the left-hand column on page 2820 of Wagner.

Wagner thus highlights the stability of biphenyl.

Further still, the Office fails to appreciate that Wagner describes a study of ketones not biphenyl or the compound of formula (1) of the present claims. Biphenyl is used in the Wagner experiments as a quencher not as a compound undergoing substitution. Wagner's teaching is with regard to the quenching effect of biphenyl, not with regard to any propensity of biphenyl or a biphenyl derivative to undergo dissociation or other types of photochemistry.

The Office cites to the left-hand column of page 2824 of Wagner as especially relevant to the claimed invention. Applicants point out that the cited disclosure is relevant to ortho substitution of a biphenyl group, not ortho or meta substitution of the core of formula (1).

The Office failed to provide any reasonable explanation how the disclosure of Wagner has a nexus to the presently claimed invention. Applicants submit that Wagner's disclosure that biphenyl is resistant to photochemistry and is used as a quencher for other chemical compounds teaches away from the presently claimed invention in which the photolability of a compound is desirably increased.

Finally, the Office cites to Adam for the reason that this reference teaches ortho and para positional effects in biphenyl chromophores. The Adam disclosure is entirely irrelevant to the question at hand. Again the Office confuses the reactivity of a biphenyl molecule with the reactivity of the core of formula (1). Other than describing the absorption spectrum of biphenyl, Adam in no way shape or form includes disclosure that suggests or would motivate one of ordinary skill in the art to modify the compound of formula (1) at the R² position in the manner presently claimed.

In summary, the cited art relates to photochemical effects and/or compounds that have nothing to do with the claimed invention. The Office fails to link the cited references to the claimed invention and fails to provide a reasonable explanation why one of ordinary skill in the art would find a nexus between the disclosure of the cited art and the presently claimed invention.

Moreover, Applicants provide a direct side-by-side comparison of the claimed invention with the closest prior art, i.e., Pfleiderer. Table 2 of the specification compares the compound of Pfleiderer with the presently claimed invention. Compound 26 in Table 2 corresponds to Pfleiderer (i.e., R² is an H atom). Compounds 21-23 correspond with the presently claimed invention which includes a phenyl group at the R² position and a deoxynucleoside protecting group. Although the core molecules are the same except for the R² group, the compound of the presently claimed invention has a half life in the range 15-17 seconds whereas the half life for the Pfleiderer compound is 58 seconds (more than 3 times longer than that of the claimed invention).

Applicants submit that the examples of the specification prove that substantially improved performance is obtained when an aryl group is present at the R² position. Applicants submit that the examples rebut the Office's assertion of obviousness and respectfully request withdrawal of the rejection.

Some of the new dependent claims are drawn to embodiments of the invention where the R² group is a phenyl group such as the phenyl group substituted compounds of the examples. Applicants draw the Office's attention to new Claims 55-57 in particular. The new dependent claims recite specific R¹, R², R³, R⁴ and/or R⁶ groups as well as specific Z and X groups. Tables 3 and 4 of the specification show substantially improved photolysis half lives in comparison to compound 26 (e.g., the closest prior art). Improved photolysis is shown for compounds tested both as dry materials and in the form of aqueous solutions. Nothing in the art cited by the Office suggests that the particular embodiments encompassed by new Claims 55-57 would be expected to show the improved photolysis demonstrated by Applicants in the examples of the original specification.

In other embodiments Applicants now claim certain derivatives that further define the substituents of the claimed compound. The new dependent claims are further patentable for the reason that the new dependent claims do not include the language and/or terms to which the Office objects in the present Office Action.

35 U.S.C. 112

The Office rejected the claims for failing to meet the written description requirement. The rejection includes a hodgepodge of legal citations and conflicting logic. For example, the Office cites to case law relating to genomes and protein sequences which nothing to do with the presently claimed *compound* (see the citations to, e.g., *Fiddes*, *University of California*, and *In re Curtis*). On the one hand the Office asserts that the terms of the claims are in contravention of the written description requirement. Conversely, on the other hand the Office takes great pains to argue that those of skill in the art would understand and recognize the advantages of claimed invention so clearly as to render it obvious (see the discussion above regarding the rejection under 35 U.S.C. §103).

In particular, the Office asserts the following with respect to terms such as “leaving group” etc.:

...only the structurally defined compounds, but not the full breadth of the claims, meet the written description proviso of 35 USC 112, first paragraph.

See page 8 of the September 30, Office Action.

The Office applies an incorrect standard for determining compliance with the written description requirement. It is incontrovertible that Applicants were in possession of the claimed invention at the time the application was filed for the reason that the terms and/or subject matter to which the Office objects *were present in the original claims*. The Office’s assertion that Applicants were not in possession of subject matter that was explicitly claimed at the time the application was filed defies all logic.

Further, there is no prohibition on claiming an invention using functional language such as “leaving group”. Applicants draw the Office’s attention to MPEP 2173.05(g):

A functional limitation is an attempt to define something by what it does, rather than by what it is (e.g., as evidenced by its specific structure or specific ingredients). There is nothing inherently wrong with defining some part of an invention in functional terms. Functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971).

If the Office wishes to comment on the definiteness of the claims, the Office should properly do so under 35 U.S.C. §112, second paragraph.

The Office further asserts:

The species specifically disclosed are not representative of the genus because the genus is highly variant.

See page 8 of the September 30, Office Action.

The Office’s assertion makes no sense. Either the species falls within the genus or it doesn’t. If it does, then, by definition, it is representative of the genus. Any alleged variance of the genus recited in the claims is not objectionable under 35 U.S.C. §112, first paragraph.

The rejection is thus not supportable and should properly be withdrawn.

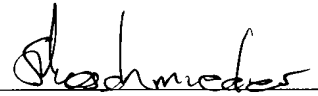
Respectfully submitted,

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A handwritten signature in black ink, appearing to read 'Stefan U. Koschmieder', is written over a horizontal line.

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